

IPv6 Evaluation Status of LTSL

Oct 24th, 2014

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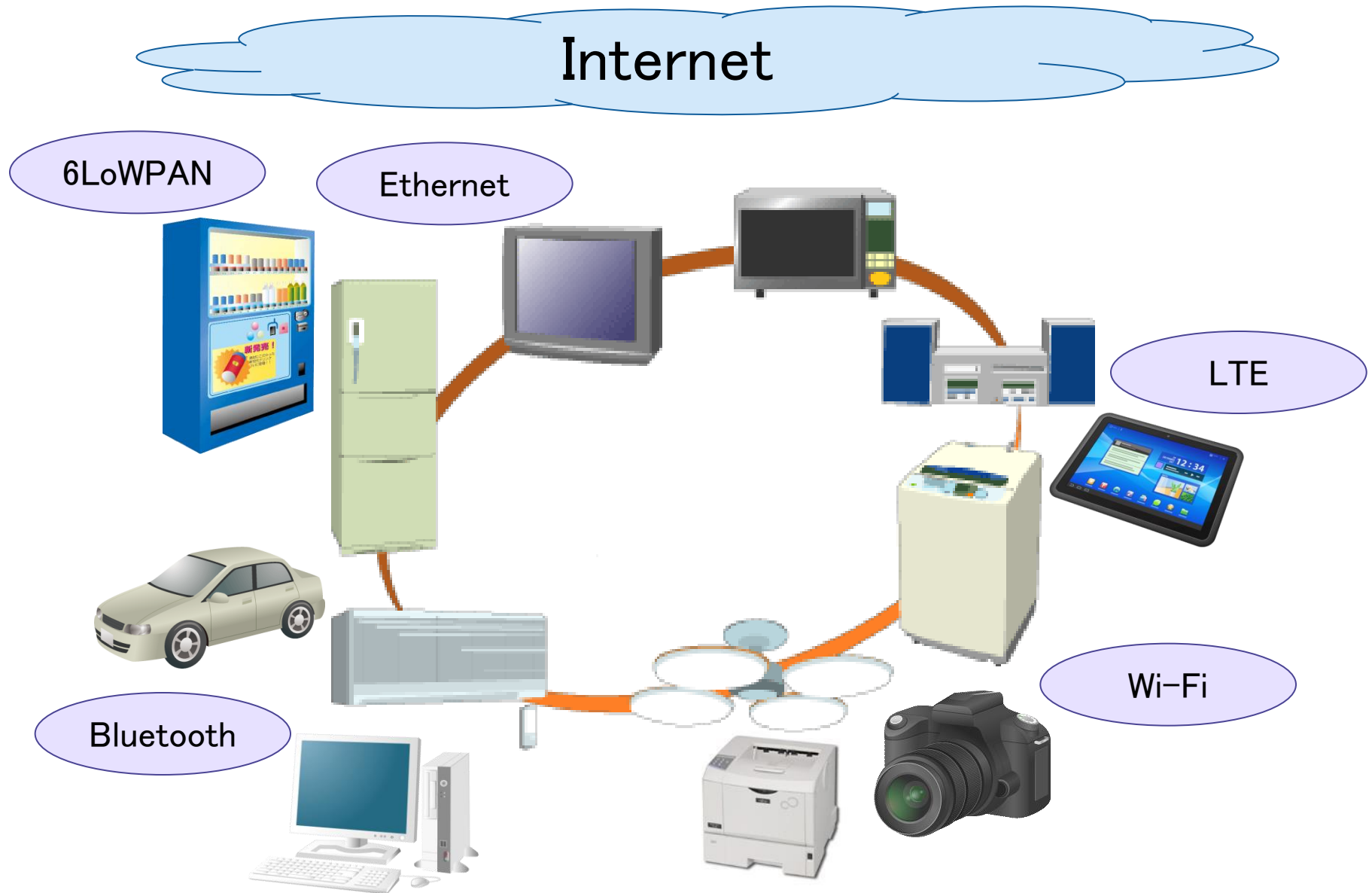
- In-House Embedded Linux Distributor of Fujitsu
- Our Distribution includes LTSI Kernel and is built with Yocto Project
- Our Distribution is used for
 - Server System Controller
 - Storage System
 - Network Equipment
 - Printer
 - IVI
etc.



- Introduction
 - IoT devices need IPv6
 - IPv6 Ready Logo Approved
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- Analysis of Section 2 (Neighbor Discovery for IPv6)
 - Dropped Redirect ICMP Message with no Redirected Header option
 - Redirect Source Address is not the current first-hop router
- Conclusion
 - Summary


Introduction

IoT devices need IPv6



IPv6 Ready Logo Approved





IPv6 Ready Logo Program Approved List - Mozilla Firefox

Program App... +

v.ipv6ready.org/db/index.php/public/search/?vn=fujitsu&do=1&lim=25 ☆ Google

Approved Date ▲▼	Application Phase ▲▼	Test Category ▲▼	Vendor Name ▲▼	Region/Country Name ▲▼	Product Name	Product Version	Product Classification ▲▼	Con Test
02-CS-001003	2014/04/02	Phase-2	IPsec	FUJITSU COMPUTER TECHNOLOGIES LIMITED	JP	ubinux	End-Node	1.11
02-C-001143	2014/02/13	Phase-2	Core Protocols	Fujitsu	JP	AROMA-Plus	Host	4.0.6
02-C-001142	2014/02/13	Phase-2	Core Protocols	Fujitsu	JP	AROMA-Plus	Host	4.0.6
02-C-001115	2013/12/17	Phase-2	Core Protocols	Fujitsu	JP	LT270S2	Host	4.0.6
02-C-001112	2013/12/12	Phase-2	Core Protocols	FUJITSU LIMITED	JP	FUJITSU Network MobiSart	Router	4.0.6
02-C-001003	2013/06/23	Phase-2	Core Protocols	FUJITSU COMPUTER TECHNOLOGIES LIMITED	JP	ubinux	Host	4.0.6
02-C-000711	2012/06/11	Phase-2	Core Protocols	Fujitsu Technology Solutions	DE	openNet Server (BS2000/OSD)	Host	4.0.6
02-C-000583	2011/11/16	Phase-2	Core Protocols	FUJITSU LIMITED	JP	Si-R G series	Router	4.0.6

<https://www.ipv6ready.org>

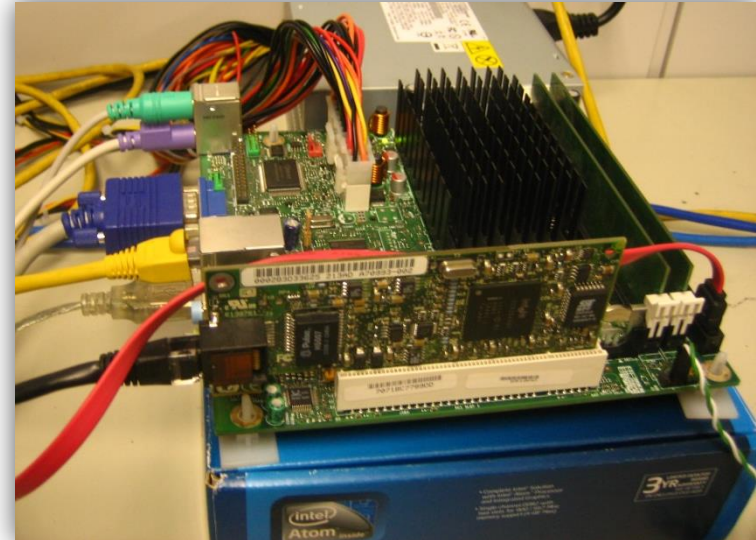
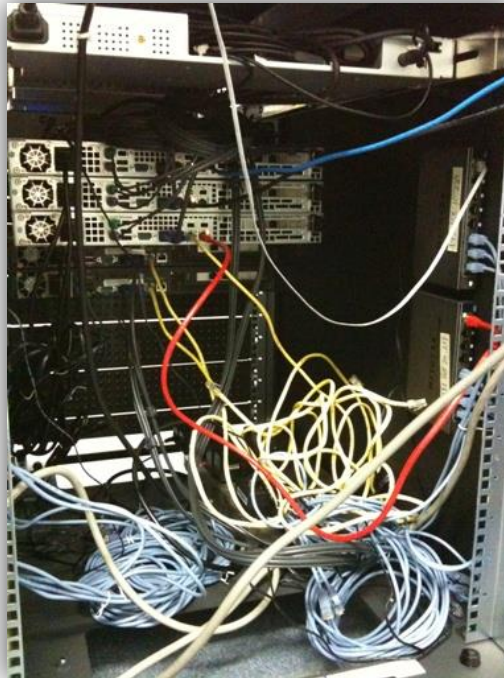
Our Distribution was approved with
Kernel v2.6.29, v2.6.31, v2.6.36, v3.0 and v3.4-ltsi



Evaluation

- What's IPv6 Ready Logo
<https://www.ipv6ready.org>
- IPv6 Ready Logo test suite
<http://www.tahi.org>
- Conformance test suite of IPv6 specification
- Test for IPv6 protocol stack (only Kernel)

- Kernel Version : v3.10-ltsi, v3.14
- Test Specification : 4.0.6
- Tool Version : REL_3_3_2
- Test Program Version : V6LC_5_0_0
- Target Device : Intel D510MO (Atom)



Results of IPv6 Ready Logo Conformance Test

■ v3.10.31-ltsi

Section	RFC	Summary	Total	Pass	Fail	N/A
Section 1	RFC 2460	IPv6 Specification	54	53	0	1 _(*)
Section 2	RFC 4861	Neighbor Discovery for IPv6	236	214	14	8
Section 3	RFC 4862	IPv6 Stateless Address Autoconfiguration	45	44	1	0
Section 4	RFC 1981	Path MTU Discovery for IPv6	16	15	0	1 _(*)
Section 5	RFC 4443	ICMPv6	25	24	0	1 _(*)

■ v3.14.22

Section	RFC	Summary	Total	Pass	Fail	N/A
Section 1	RFC 2460	IPv6 Specification	54	53	0	1 _(*)
Section 2	RFC 4861	Neighbor Discovery for IPv6	236	236	0	0
Section 3	RFC 4862	IPv6 Stateless Address Autoconfiguration	45	45	0	0
Section 4	RFC 1981	Path MTU Discovery for IPv6	16	15	0	1 _(*)
Section 5	RFC 4443	ICMPv6	25	24	0	1 _(*)

(*) Initialization: Reboot Target

Fails of Section 2 (Neighbor Discovery for IPv6) (3.10.31-Itsi)

No.	Name	Title
185	Test v6LC.2.3.4: Redirected to Alternate Router: Valid (Hosts Only)	Default Router Switch
187	Test v6LC.2.3.4: Redirected to Alternate Router: Valid (Hosts Only)	Part A: dst=global, w/o TLL, w/o Redirected Header
189	Test v6LC.2.3.5: Redirected to Alternate Router: Suspicious (Hosts only)	Part C: dst=global, w/ TLL, w/o Redirected Header
190	Test v6LC.2.3.5: Redirected to Alternate Router: Suspicious (Hosts only)	Part A: Option Unrecognized
200	Test v6LC.2.3.7: Redirected Twice (Hosts Only)	Redirected Twice
201	Test v6LC.2.3.8: Invalid Option (Hosts Only)	Part A: Path MTU Option
202	Test v6LC.2.3.8: Invalid Option (Hosts Only)	Part B: Prefix Information Option
203	Test v6LC.2.3.8: Invalid Option (Hosts Only)	Part C: Source Link-layer Address Option
204	Test v6LC.2.3.9: No Destination Cache Entry (Hosts Only)	No Destination Cache Entry
206	Test v6LC.2.3.10: Neighbor Cache Updated, No Neighbor Cache Entry (Hosts Only)	Part B: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
210	Test v6LC.2.3.11: Neighbor Cache Updated from State INCOMPLETE (Hosts Only)	Part B: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
215	Test v6LC.2.3.12: Neighbor Cache Updated from State REACHABLE (Hosts Only)	Part C: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
220	Test v6LC.2.3.13: Neighbor Cache Updated from State STALE (Hosts Only)	Part C: TLLA Option, No Redirected Packet Option, Link-layer Address Updated
225	Test v6LC.2.3.14: Neighbor Cache Updated from State PROBE (Hosts Only)	Part C: TLLA Option, No Redirected Packet Option, Link-layer Address Updated

Fails of Section 3 (IPv6 Stateless Address Autoconfiguration) (3.10.31-Itsi)

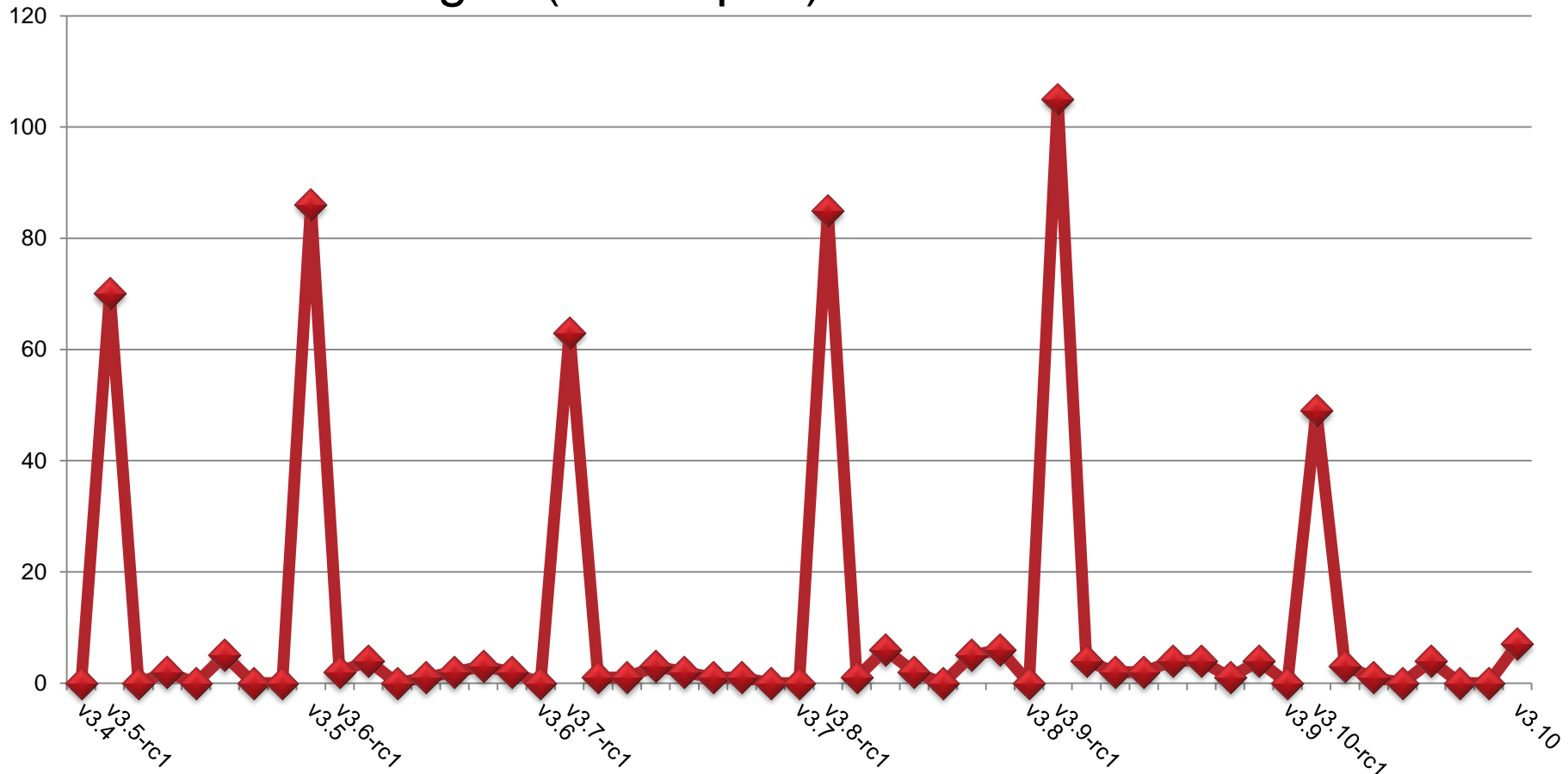
No.	Name	Title
8	Test v6LC.3.1.3: Validation of DAD Neighbor Solicitations	Part C: NUT receives invalid DAD NS (Dst = NUT's tentative address)

Number of Changes in IPv6 stack

■ IPv6 stack has a lot of changes (v3.4..v3.10)

```
% git log --oneline v3.4..v3.10 -- net/ipv6 | wc -l  
546
```

■ Number of Changes (-- net/ipv6)



Analysis of Section 3

(IPv6 Stateless Address Autoconfiguration)

■ Detected Router Solicitation Message with addressed uninitialized

- Must to detect Neighbor Solicitation Message

■ Read the RFC 4862, Found the cause

Packet Reverse Log

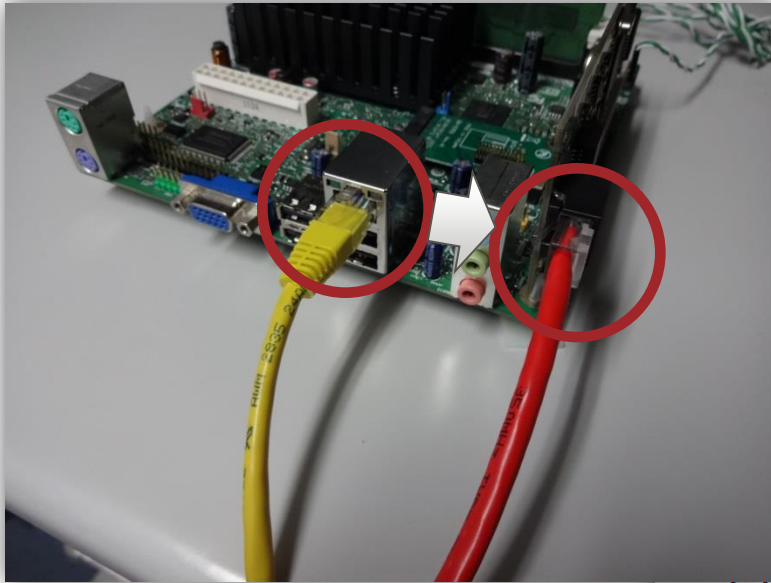
Recv at 19:38:53

```
Frame Ether (length:70)
Hdr Ether (length:14)
  DestinationAddress = 33:33:00:00:00:02
  SourceAddress = 00:23:26:89:59:0e
  Type = 34525
Packet IPv6 (length:56)
Hdr IPv6 (length:40)
  Version = 6
  TrafficClass = 0
  FlowLabel = 0
  PayloadLength = 16
  NextHeader = 58
  HopLimit = 255
  SourceAddress = fe80::223:26ff:fe89:590e
  DestinationAddress = ff02::1
ICMPv6_RS (length:16)
  Type = 133
  Code = 0
  Checksum = 31673 calc(31673)
  Reserved = 0
  Opt ICMPv6_SLL (length:8)
    Type = 1
    Length = 1
    LinkLayerAddress = 00:23:26:89:59:0e
===DADNS from NUT=====
ng compare ether_nt2tentsolnode DestinationAddress received:33:33:00:00:02
ng compare Hdr_IPv6_DADNS from NUT.SourceAddress received:fe80::223:26ff:fe89:590e
ng compare Hdr_IPv6_DADNS from NUT.DestinationAddress received:ff02::1
ng meta Packet_IPv6.ICMPv6_RS != Packet_IPv6.ICMPv6_RS
```

Neighbor Solicitation Message Format

Protocol	Field	Value
IPv6	Source Address	::(unspecified address)
IPv6	Distination Address	Solicited-Node Multicast Address
ICMPv6	Target Address	Tentative Address

- Changed Ethernet device to be used for testing



```
Count Frame_Ether.Packet_IrV6 := Frame_Ether.Packet_IrV6
v at 20:10:18
me Ether (length:78)
dr_Ether (length:14)
DestinationAddress = 33:33:ff:d3:36:25
SourceAddress = 04:02:b3:d3:36:25
Type = 34525
packet_IrV6 (length:64)
Hdr_IrV6 (length:40)
Version = 6
TrafficClass = 0
FlowLabel = 0
PayloadLength = 24
NextHeader = 58
HopLimit = 255
SourceAddress = ::
DestinationAddress = ::1:ffd3:3625
ICMPv6_NS (length:24)
Type = 135
Code = 0
Checksum = 22068 calc(22068)
Reserved = 0
TargetAddress = fe80::602:b3ff:fed3:3625
===DADNS_from_NUT=====
```

- Section 3 Test Cases are **Passed**

Analysis of Section 2

(Neighbor Discovery for IPv6)

- Recieved Redirect ICMP Message with no Redirected Header option
 - EchoReply has not been forwarded to the next hop that is specified in

```
Send Redirect w/o TLL, w/o Redirected Header: TR1 (link-local) -> HUT (global) at 18:5
Frame Ether (length:94)
  Hdr Ether (length:14)
    DestinationAddress = 00:23:26:89:59:0e
    SourceAddress = 00:00:00:00:a0:a0
  Type = 34525
  Packet IPv6 (length:80)
    Hdr IPv6 (length:40)
      Version = 6
      TrafficClass = 0
      FlowLabel = 0
      PayloadLength = 40
      NextHeader = 58
      HopLimit = 255
      SourceAddress = fe80::200:ff:fe00:a0a0
      DestinationAddress = 3ffe:501:ffff:100:223:26ff:fe89:590e
    ICMPv6 Redirect (length:40)
      Type = 137
      Code = 0
      Checksum = 10144 calc(10144)
      Reserved = 0
      TargetAddress = fe80::200:ff:fe00:a1a1
      DestinationAddress = 3ffe:501:ffff:0:200:ff:fe00:100
```

Node	Link-local Address	Link-local Address
TR1	00:00:00:00:a0:a0	fe80::200:ff:fe00:a0a0
TR2	00:00:00:00:a1:a1	fe80::200:ff:fe00:a1a1

```
Recv at 18:57:11
Frame Ether (length:70)
  Hdr Ether (length:14)
    DestinationAddress = 00:00:00:00:a0:a0
    SourceAddress = 00:23:26:89:59:0e
  Type = 34525
  Packet IPv6 (length:56)
    Hdr IPv6 (length:40)
      Version = 6
      TrafficClass = 0
      FlowLabel = 0
      PayloadLength = 16
      NextHeader = 58
      HopLimit = 64
      SourceAddress = 3ffe:501:ffff:100:223:26ff:fe89:590e
      DestinationAddress = 3ffe:501:ffff:0:200:ff:fe00:100
    ICMPv6 EchoReply (length:16)
      Type = 129
      Code = 0
      Checksum = 53974 calc(53974)
      Identifier = 0
      SequenceNumber = 0
      Payload (length:8)
        data = 01234567 89abcdef
=====tn1 erep offlink via tr2=====
ng compare_HETHER_nut_to_tr2.DestinationAddress received:00:00:00:00:a0:a0 = 0
```

■ IPv6 stack has a lot of changes


```
% git log --oneline v3.10..v3.14 -- net/ipv6 | wc -l  
364
```

■ Number of Changes (-- net/ipv6)

range		commit
3.10	-> 3.11-rc1	45
3.11-rc1	-> 3.11	21
3.11	-> 3.12-rc1	79
3.12-rc1	-> 3.12	25
3.12	-> 3.13-rc1	74
3.13-rc1	-> 3.13	28
3.13	-> 3.14-rc1	73
3.14-rc1	-> 3.14	20

■ Result of Section 2 Test(Neighbor Discovery for IPv6)

21 Changes



No.	v3.10	v3.11-rc1	v3.11
185	FAIL	FAIL	PASS
187	FAIL	FAIL	PASS
189	FAIL	FAIL	PASS
190	FAIL	FAIL	PASS
200	FAIL	FAIL	PASS
201	FAIL	FAIL	PASS
202	FAIL	FAIL	PASS
203	FAIL	FAIL	PASS
204	FAIL	FAIL	PASS
206	FAIL	FAIL	PASS
210	FAIL	FAIL	PASS
215	FAIL	FAIL	PASS
220	FAIL	FAIL	PASS
225	FAIL	FAIL	PASS

■ Found a patch

```
commit c92a59eca86f5d13ae4d481c3bae6b54609fe006
```

```
Author: Duan Jiong <duanj.fnst@cn.fujitsu.com>
```

```
Date: Thu Aug 22 12:07:35 2013 +0800
```

```
ipv6: handle Redirect ICMP Message with no Redirected Header option
```


rfc 4861 says the Redirected Header option is optional, so the kernel should not drop the Redirect Message that has no Redirected Header option. In this patch, the function `ip6_redirect_no_header()` is introduced to deal with that condition.

```
Signed-off-by: Duan Jiong <duanj.fnst@cn.fujitsu.com>
```

```
Acked-by: Hannes Frederic Sowa <hannes@stressinduktion.org>
```

■ Backport to v3.10.57 and Retry the Section 2


1 Change



No.	v3.10.57	v3.10.57 + Patch
185	FAIL	PASS
187	FAIL	PASS
189	FAIL	PASS
190	FAIL	PASS
200	FAIL	PASS
201	FAIL	PASS
202	FAIL	PASS
203	FAIL	PASS
204	FAIL	PASS
206	FAIL	PASS
210	FAIL	PASS
215	FAIL	PASS
220	FAIL	PASS
225	FAIL	PASS

■ New 3 Fails are detected in another testcases

1 Change



No.	v3.10.57	v3.10.57+Patch
177	PASS	FAIL
185	FAIL	PASS
187	FAIL	PASS
189	FAIL	PASS
190	FAIL	PASS
192	PASS	FAIL
200	FAIL	PASS
201	FAIL	PASS
202	FAIL	PASS
203	FAIL	PASS
204	FAIL	PASS
206	FAIL	PASS
210	FAIL	PASS
215	FAIL	PASS
220	FAIL	PASS
225	FAIL	PASS
229	PASS	FAIL

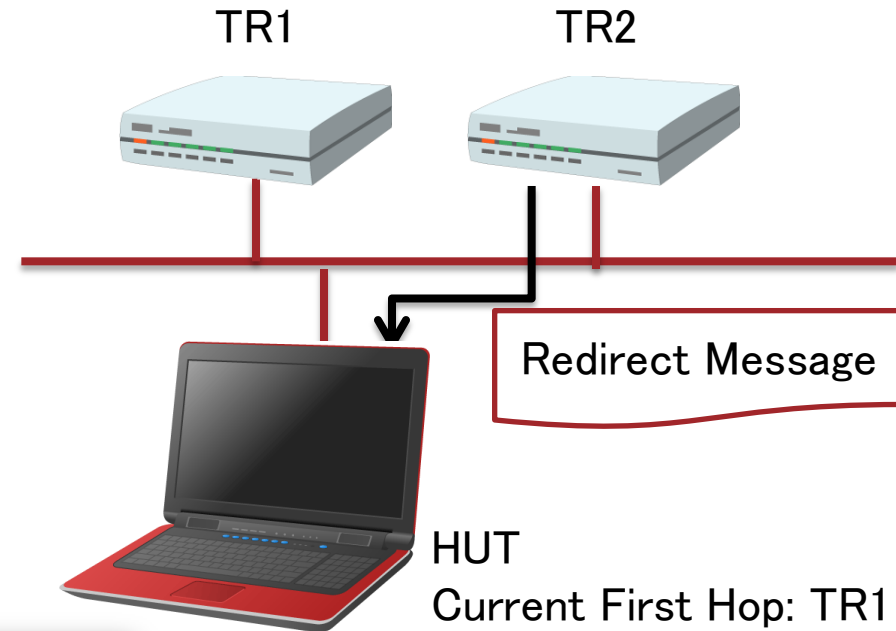
Fails of Section 2 (Neighbor Discovery for IPv6) (3.10.57 + Patch)

No.	Name	Title
177	Test v6LC.2.3.3: Redirected On-link: Invalid (Hosts Only)	Part B: Redirect Source Address is not the current first-hop router
192	Test v6LC.2.3.6: Redirected to Alternate Router: Invalid (Hosts Only)	Part B: Redirect Source Address is not the current first-hop router
229	Test v6LC.2.3.15: Invalid Redirect does not Update Neighbor Cache (Hosts Only)	Part B: Redirect Source Address is not the current first-hop router

■ Host handle the redirect message from non current first hop

Send Redirect w/ TLL: TR2 (link-local) -> HUT (global) at 19:11:14

```
Frame Ether (length:102)
  Hdr Ether (length:14)
    DestinationAddress = 00:00:00:00:00:00
    SourceAddress = 00:00:00:00:00:00
  Type = 84
  Packet IPv6 (length:88)
    Hdr IPv6 (length:40)
      Version = 6
      TrafficClass = 0
      FlowLabel = 0
      PayloadLength = 48
      NextHeader = 58
      HopLimit = 255
      SourceAddress = fe80::200:ff:fe00:a1a1
      DestinationAddress = 3ffe:501:ffff:100:602:b3ff:fed3:3625
    ICMPv6 Redirect (length:48)
      Type = 0
      Code = 0
      Checksum = 5300 calc(5300)
      Reserved = 0
      TargetAddress = fe80::200:ff:fe00:a1a1
      DestinationAddress = 3ffe:501:ffff:0:200:ff:fe00:100
      Opt ICMPv6_TLL (length:8)
        Type = 2
        Length = 1
        LinkLayerAddress = 00:00:00:00:a1:a1
```



Recv at 19:11:14

```
Frame Ether (length:70)
  Hdr Ether (length:14)
    DestinationAddress = 00:00:00:00:a1:a1
    SourceAddress = 00:00:00:00:00:00
  Type = 84
  Packet IPv6 (length:58)
    Hdr IPv6 (length:40)
      Version = 6
      TrafficClass = 0
      FlowLabel = 0
      PayloadLength = 16
      NextHeader = 58
      HopLimit = 64
      SourceAddress = 3ffe:501:ffff:100:602:b3ff:fed3:3625
      DestinationAddress = 3ffe:501:ffff:0:200:ff:fe00:100
    ICMPv6 EchoReply (length:16)
      Type = 129
      Code = 0
      Checksum = 25750 calc(25750)
      Identifier = 0
      SequenceNumber = 0
      Payload (length:8)
        data = 01234567 89abcdef
    =====tnl errep offlink via tr1=====
    ng compare_ETHER nut to tr1.DestinationAddress received:00:00:00:00:a1:a1 = 00:00:00:00:a0:a0
```

■ Result of Section 2 Test

21 Changes 79 Changes

No.	v3.10	v3.11-rc1	v3.11	v3.12-rc1
177	PASS	PASS	FAIL	PASS
185	FAIL	FAIL	PASS	PASS
187	FAIL	FAIL	PASS	PASS
189	FAIL	FAIL	PASS	PASS
190	FAIL	FAIL	PASS	PASS
192	PASS	PASS	FAIL	PASS
200	FAIL	FAIL	PASS	PASS
201	FAIL	FAIL	PASS	PASS
202	FAIL	FAIL	PASS	PASS
203	FAIL	FAIL	PASS	PASS
204	FAIL	FAIL	PASS	PASS
206	FAIL	FAIL	PASS	PASS
210	FAIL	FAIL	PASS	PASS
215	FAIL	FAIL	PASS	PASS
220	FAIL	FAIL	PASS	PASS
225	FAIL	FAIL	PASS	PASS
229	PASS	PASS	FAIL	PASS

■ git bisect

- Find by binary search the change that introduced a bug**fix**

■ git bisect view

- See the bisection process

- `git bisect start v3.12-rc1 v3.11 -- net/ipv6`
- `git bisect view --oneline`

```
2c861cc ipv6: don't call fib6_run_gc() until routing is ready
04f0888 fib6_rules: fix indentation
ae7b4e1 net: fib: fib6_add: fix potential NULL pointer dereference
8112b1f ipv6/exthdrs: accept tlv which includes only padding
cc998ff Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net-next
06c5405 Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net
b55b76b ipv6: introduce function to find route for redirect
27703bb Merge tag 'PTR_RET-for-linus' of git://git.kernel.org/pub/scm/linux/kernel/git/rusty/linux
b4af8de net: ipv6: mld: introduce mld_(gq, ifc, dad)_stop_timer functions
2b7c121 net: ipv6: mld: refactor query processing into v1/v2 functions
cc7f7ab net: ipv6: mld: similarly to MLDv2 have min max_delay of 1
58c0ecf net: ipv6: mld: implement RFC3810 MLDv2 mode only
ef35b17 net: ipv6: mld: get rid of MLDV2_MRC and simplify calculation
6c56b7b net: ipv6: mld: clean up MLD_V1_SEEN macro
89225d1 net: ipv6: mld: fix v1/v2 switchback timeout to rfc3810, 9.12.
3a1c756 net: ipv6: tcp: fix potential use after free in tcp_v6_do_rcv
25a6e6b ipv6: Don't depend on per socket memory for neighbour discovery messages
639739b ipv6: fix null pointer dereference in __ip6addrlbl_add
48f8e0a Merge branch 'master' of git://git.kernel.org/pub/scm/linux/kernel/git/pablo/nf-next
7cc9eb6 netfilter: SYNPROXY: let unrelated packets continue
775ada6 netfilter: more strict TCP flag matching in SYNPROXY
c995ae2 tcp: Change return value of tcp_rcv_established()
ea23192 tunnels: harmonize cleanup done on skb on rx path
963a88b tunnels: harmonize cleanup done on skb on xmit path
8b27f27 skb: allow skb_scrub_packet() to be used by tunnels
8b7ed2d iptunnels: remove net arg from iptunnel_xmit()
13c7bf0 ipv6: ipv6_create_tempaddr cleanup
61e76b1 ICMPv6: treat dest unreachable codes 5 and 6 as EACCES, not EPROTO
3e25c65 net: neighbour: Remove CONFIG_ARPD
eb3c0d8 net: unify skb_udp_tunnel_segment() and skb_udp6_tunnel_segment()
d949d82 ipv6: Add generic UDP Tunnel segmentation
f564f45 vxlan: add ipv6 proxy support
f39dc10 ipv6: move in6_dev_finish_destroy() into core kernel
e15a00a vxlan: add ipv6 route short circuit support
caf92bc ipv6: do not call ndisc_send_rs() with write lock
034dfc5 ipv6: export in6addr_loopback to modules
5f81bd2 ipv6: export a stub for IPv6 symbols used by vxlan
788787b ipv6: move ip6_local_out into core kernel
3ce9b35 ipv6: move ip6_dst_hoplimit() into core kernel
816c5b5 ipv6: Remove redundant sk variable
b800c3b ipv6: drop fragmented ndisc packets by default (RFC 6980)
4ad3622 netfilter: add IPv6 SYNPROXY target
81eb6a1 net: syncookies: export cookie_v6_init_sequence/cookie_v6_check
```

```
41d73ec netfilter: nf_conntrack: make sequence number adjustments usable without NAT
706f515 netfilter: nf_defrag_ipv6.o included twice
affe759 netfilter: ip6t_REJECT: tcp-reset using wrong MAC source if bridged
b05930f Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net
9fd0784 net: ipv6: mcast: minor: use defines for rfc3810/8.1 lengths
c2cef4e net: ipv6: minor: *_start_timer: rather use unsigned long
8469896 net: ipv6: igmp6_event_query: use msecs_to_jiffies
e837735 ip6_tunnel: ensure to always have a link local address
7eaa48a Revert "ipv6: fix checkpatch errors in net/ipv6/addrconf.c"
df8372c ipv6: fix checkpatch errors in net/ipv6/addrconf.c
ba3542e ipv6: convert the uses of ADBG and remove the superfluous parentheses
89d5e23 Merge branch 'master' of git://git.kernel.org/pub/scm/linux/kernel/git/pablo/nf-next
2ff1cf1 Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net
d14c5ab net: proc_fs: trivial: print UIDs as unsigned int
0bd8762 ip6tnl: add x-netns support
fc8f999 ipv4 tunnels: use net_eq() helper to check netns
fc4eba5 ipv6: make unsolicited report intervals configurable for mld
c655bc6 netfilter: nf_conntrack: don't send destroy events from iterator
1f07d03 net: add SNMP counters tracking incoming ECN bits
0e76a3a Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net
73f5698 fib_rules: fix suppressor names and default values
6ef94cf fib_rules: add route suppression based on ifgroup
d1c53c8 icmpv6_filter: allow ICMPv6 messages with bodies < 4 bytes
9cc08af icmpv6_filter: fix "_hdr" incorrectly being a pointer
439677d ipv6: bump genid when delete/add address
46b3a42 ipv6: fib6_rules should return exact return value
7764a45 fib_rules: add .suppress operation
ca4c3fc net: split rt_genid for ipv4 and ipv6
5ad37d5 tcp: add tcp_syncookies mode to allow unconditionally generation of syncookies
9d4a031 ipv4, ipv6: send igmpv3/mld packets with TC_PRIO_CONTROL
c9bee3b tcp: TCP_NOTSENT_LOWAT socket option
9225b23 net: ipv6 eliminate parameter "int addrlen" in function fib6_add_1
86a37de net ipv6: Remove redundant rt6i_nsiblings initialization
2b52c3a ip6mr: change the prototype of ip6_mr_forward().
375f02 tcp: consolidate SYNACK RTT sampling
8c6ffba PTR_RET is now PTR_ERR_OR_ZERO(): Replace most.
```

■ git bisect good

■ git bisect view --oneline

```
2c861cc ipv6: don't call fib6_run_gc() until routing is ready
04f0888 fib6_rules: fix indentation
ae7b4e1 net: fib: fib6_add: fix potential NULL pointer dereference
8112b1f ipv6/exthdrs: accept tlv which includes only padding
cc998ff Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net-next
06c5405 Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net
b55b76b ipv6: introduce function to find route for redirect
27703bb Merge tag 'PTR_RET-for-linus' of git://git.kernel.org/pub/scm/linux/kernel/git/rusty/linux
b4af8de net: ipv6: mld: introduce mld_{gq, ifc, dad}_stop_timer functions
2b7c121 net: ipv6: mld: refactor query processing into v1/v2 functions
cc7f7ab net: ipv6: mld: similarly to MLDv2 have min max_delay of 1
58c0ecf net: ipv6: mld: implement RFC3810 MLDv2 mode only
e3f5b17 net: ipv6: mld: get rid of MLDV2_MRC and simplify calculation
6c567b7 net: ipv6: mld: clean up MLD_V1_SEEN macro
89225d1 net: ipv6: mld: fix v1/v2 switchback timeout to rfc3810, 9.12.
3a1c756 net: ipv6: tcp: fix potential use after free in tcp_v6_do_rcv
25a6e6b ipv6: Don't depend on per socket memory for neighbour discovery messages
639739b ipv6: fix null pointer dereference in __ip6addrlbl_add
48f8e0a Merge branch 'master' of git://git.kernel.org/pub/scm/linux/kernel/git/pablo/nf-next
7cc9eb6 netfilter: SYNPROXY: let unrelated packets continue
775ada6 netfilter: more strict TCP flag matching in SYNPROXY
c995ae2 tcp: Change return value of tcp_rcv_established()
ea23192 tunnels: harmonize cleanup done on skb on rx path
963a88b tunnels: harmonize cleanup done on skb on xmit path
8b27f27 skb: allow skb_scrub_packet() to be used by tunnels
8b7ed2d iptunnels: remove net arg from iptunnel_xmit()
13c7bf0 ipv6: ipv6_create_tempaddr cleanup
61e76b1 ICMPv6: treat dest unreachable codes 5 and 6 as EACCES, not EPROTO
3e25c65 net: neighbour: Remove CONFIG_ARPD
eb3c0d8 net: unify skb_udp_tunnel_segment() and skb_udp6_tunnel_segment()
d949d82 ipv6: Add generic UDP Tunnel segmentation
f564f45 vxlan: add ipv6 proxy support
f39dc10 ipv6: move in6_dev_finish_destroy() into core kernel
e15a00a vxlan: add ipv6 route short circuit support
caf92bc ipv6: do not call ndisc_send_rs() with write lock
034dfc5 ipv6: export in6addr_loopback to modules
5f81bd2 ipv6: export a stub for IPv6 symbols used by vxlan
788787b ipv6: move ip6_local_out into core kernel
3ce9b35 ipv6: move ip6_dst_hoplimit() into core kernel
8c6ffba PTR_RET is now PTR_ERR_OR_ZERO(): Replace most.
```

■ git bisect good

■ git bisect view --oneline

```
2c861cc ipv6: don't call fib6_run_gc() until routing is ready
04f0888 fib6_rules: fix indentation
ae7b4e1 net: fib: fib6_add: fix potential NULL pointer dereference
8112b1f ipv6/exthdrs: accept tlv which includes only padding
cc998ff Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net-next
06c5405 Merge git://git.kernel.org/pub/scm/linux/kernel/git/davem/net
b55b76b ipv6:introduce function to find route for redirect
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cc7f7ab net: ipv6: mld: similarly to MLDv2 have min max_delay of 1
58c0ecf net: ipv6: mld: implement RFC3810 MLDv2 mode only
e3f5b17 net: ipv6: mld: get rid of MLDV2_MRC and simplify calculation
6c567b7 net: ipv6: mld: clean up MLD_V1_SEEN macro
3a1c756 net: ipv6: tcp: fix potential use after free in tcp_v6_do_rcv
25a6e6b ipv6: Don't depend on per socket memory for neighbour discovery messages
639739b ipv6: fix null pointer dereference in __ip6addrlbl_add
13c7bf0 ipv6: ipv6_create_tempaddr cleanup
61e76b1 ICMPv6: treat dest unreachable codes 5 and 6 as EACCES, not EPROTO
8c6ffba PTR_RET is now PTR_ERR_OR_ZERO(): Replace most.
```

- git bisect bad
- git bisect view --oneline

```
% git bisect view --oneline
```

```
b55b76b ipv6:introduce function to find route for redirect
```

```
b4af8de net: ipv6: mld: introduce mld_{gq, ifc, dad}_stop_timer functions
```

```
2b7c121 net: ipv6: mld: refactor query processing into v1/v2 functions
```

```
cc7f7ab net: ipv6: mld: similarly to MLDv2 have min max_delay of 1
```

```
58c0ecf net: ipv6: mld: implement RFC3810 MLDv2 mode only
```

```
e3f5b17 net: ipv6: mld: get rid of MLDV2_MRC and simplify calculation
```

```
6c567b7 net: ipv6: mld: clean up MLD_V1_SEEN macro
```

■ Found a patch

commit b55b76b22144ab97cefc3862bab61f088adf411

Author: Duan Jiong <duanj.fnst@cn.fujitsu.com>

Date: Wed Sep 4 19:44:21 2013 +0800

ipv6:introduce function to find route for redirect

RFC 4861 says that the IP source address of the Redirect is the same as the current first-hop router for the specified ICMP Destination Address, so the gateway should be taken into consideration when we find the route for redirect.

There was once a check in commit a6279458c534d01ccc39498aba61c93083ee0372 ("NDISC: Search over all possible rules on receipt of redirect.") and the check went away in commit b94f1c0904da9b8bf031667afc48080ba7c3e8c9 ("ipv6: Use icmpv6_notify() to propagate redirect, instead of rt6_redirect()").

The bug is only "exploitable" on layer-2 because the source address of the redirect is checked to be a valid link-local address but it makes spoofing a lot easier in the same L2 domain nonetheless.

Thanks very much for Hannes's help.

Signed-off-by: Duan Jiong <duanj.fnst@cn.fujitsu.com>

Acked-by: Hannes Frederic Sowa <hannes@stressinduktion.org>

Signed-off-by: David S. Miller <davem@davemloft.net>

■ Backport to v3.10.58 and Retry Conformance Test

Section	RFC	Summary	Total	Pass	Fail	N/A
Section 1	RFC 2460	IPv6 Specification	54	53	0	1 _(*)
Section 2	RFC 4861	Neighbor Discovery for IPv6	236	236	0	0
Section 3	RFC 4862	IPv6 Stateless Address Autoconfiguration	45	45	0	0
Section 4	RFC 1981	Path MTU Discovery for IPv6	16	15	0	1 _(*)
Section 5	RFC 4443	ICMPv6	25	24	0	1 _(*)

(*) Initialization: Reboot Target

■ All Test cases are **Passed!!**

Conclusion

- 3.14-Itsi can be approved IPv6 Ready Logo
- 3.10.31-Itsi has few bugs in IPv6 stack
 - Can be Fixed by Upstream Patches
- We are planning to approve the IPv6 Ready Logo as 3.10-Itsi and 3.14-Itsi

IPv6 Ready Logo Program Approved List

■ Vendor Name: kernel.org

IPv6 Ready Logo Program Approved List

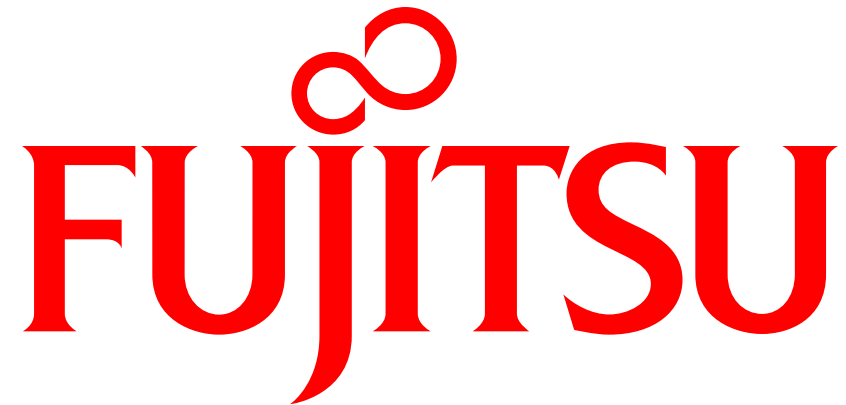
Filter By :		Region/Country Name:	- Select Region/Country -
Logo ID:	<input type="text"/>	Product Classification:	- Select One -
Approved Date:	<input type="text"/> - <input type="text"/>	OEM Licensor's Logo ID	<input type="text"/>
Application Phase:	- Select One -	Keyword:	<input type="text"/>
Test Category:	- Select One -		
Vendor Name:	<input type="text" value="kernel.org"/>	<input type="button" value="Update Results"/>	

[25 | [50](#) | [ALL](#)]

Search Result: 6 hits

Logo ID ▲▼	Approved Date ▲▼	Application Phase ▲▼	Test Category ▲▼	Vendor Name ▲▼	Region/Country Name ▲▼	Product Name	Product Version	Product Classification ▲▼	Conformance Test Version	Interoperability Test Version	OEM Licensor's Logo ID ▲▼	Update
02-CS-000208	2007/10/04	Phase-2	IPsec	kernel.org	US	Linux	2.6.20	SGW	1.8.0	1.1.0		New
02-C-000208	2007/09/26	Phase-2	Core Protocols	kernel.org	US	Linux	2.6.20	Router	3.8.10	2.8.4		New
02-C-000145	2006/05/30	Phase-2	Core Protocols	kernel.org	US	Linux	2.6.15	Host				New
02-CS-000145	2006/05/30	Phase-2	IPsec	kernel.org	US	Linux	2.6.15	End-Node	1.0.7	1.4.3		New
01-000275	2005/05/09	Phase-1		kernel.org	US	Linux	2.6.11-rc2	Router				New
01-000276	2005/05/09	Phase-1		kernel.org	US	Linux	2.6.11-rc2	Host				New

1 / 1



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